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| 10/571,735  | 12/07/2006  | Wilhelm Janssen      | (46WD) 133334       | 6902             |
| 53082   | 7590        | 01/23/2009           |                     |                  |
| General Electric Company<br>GE Global Patent Operation<br>PO Box 861<br>2 Corporate Drive, Suite 648<br>Shelton, CT 06484 |             |                      |                     |                  |
| EXAMINER  |             |                      |                     |                  |
| FINCH III, FRED E   |             |                      |                     |                  |
| ART UNIT  |             | PAPER NUMBER         |                     |                  |
| 4116  |             |                      |                     |                  |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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### Office Action Summary

**Application No.**

10/571,735

**Applicant(s)**

JANSSEN ET AL.

**Examiner**

Fred E. Finch III

**Art Unit**

4116

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-85/86)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date 08/02/2007

### **DETAILED ACTION**

This Office action is in response to the preliminary amendment filed on 28 August 2006.

#### ***Specification***

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The limitations presented in claim 4 have no clear antecedent basis in the specification. In particular, there is no mention of a "time interval between the crossover of the output voltage of a phase of the generator and an operation of an electronic switch". On page 6, lines 1-5 of the specification, it is only mentioned that control of the thyristors (electronic switches) of the AC/DC converter is amended according to the phase shifts of the generator and the frequency of the stator.

#### ***Claim Objections***

Claims 2, 3, and 5 are objected to because of the following informalities:

In re claims 2 and 3, the limitations stating "the normal grid voltage is increased again" appear to mean "the grid voltage is increased again" because in each case, the grid voltage has already been decreased from its "normal value" and is increasing again closer to the "normal value".

In re claim 5, the limitation of "the pulse width interval of the electronic switch" has no antecedent basis in this or a preceding claim.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In re claim 2, the limitation stating that the "grid voltage is decreased up to at least about 10% of its normal value" is indefinite because it is unclear how much of a decrease in the grid voltage is being claimed. It appears that this phrase could define a decrease in grid voltage of any percentage up to 10%, equal to 10%, or greater than 10%. For examination purposes, it is assumed that this limitation means that the grid voltage is reduced to about 10% of its normal value. Similarly, the limitation stating "the grid voltage is increased again up to at least about 80% of its normal value" is indefinite because it appears that any increase less than, equal to, or greater than 80% of the normal value is defined by this limitation. For purposes of examination, it is assumed that this limitation means that the grid voltage is increased to about 80% of its normal value.

In re claim 3, the limitation stating that the "grid voltage is decreased up to at least about 20% of its normal value" is indefinite because it is unclear how much of a decrease in the grid voltage is being claimed. It appears that this phrase could define a decrease in grid voltage of any percentage up to 20%, equal to 20%, or greater than 20%. For examination purposes, it is assumed that this limitation means that the grid

voltage is reduced to about 20% of its normal value. Similarly, the limitation stating "the grid voltage is increased again up to at least about 90% of its normal value" is indefinite because it appears that any increase less than, equal to, or greater than 90% of the normal value is defined by this limitation. For purposes of examination, it is assumed that this limitation means that the grid voltage is increased to about 90% of its normal value.

In re claim 4, the limitation of "the crossover of the output voltage of a phase of the generator" is indefinite because there is only one element defined in this "crossover" and it is not apparent, in light of either the claims or the specification, what the output voltage of a phase of the generator is crossing over. For purposes of examination, it is assumed that the "crossover" is a zero-crossing of the output voltage of a phase of the generator.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lof et al. (U.S. Patent 6,671,585) in view of Widmayer et al. (U.S. Patent 5,483,127).

In re claim 1, Lof discloses a method for operating a frequency converter (Fig. 10) of a generator (503) in particular of a wind energy turbine (503<sub>1</sub> through 503<sub>N</sub> represent wind turbines), in the event of a substantial grid voltage drop (Col. 20, lines

46-48 disclose that the system of Fig. 10 is used to provide extra power to the transmission grid during faults and voltage sags), wherein the frequency converter comprises an AC/DC converter (Fig. 10, AC/DC converter blocks connected to wind turbine generators), to be connected to the generator, a DC/AC converter (DC/AC converter blocks within block 505) to be connected to the voltage grid (Large scale transmission grid on right), and a DC link circuit (1001) for connecting the AC/DC converter to the DC/AC converter. However, Lof discloses that in the event of a drop in grid voltage, excess current is provided by an auxiliary generator (Fig. 10, xM) instead of altering the operation of the converter itself to provide the extra current. In particular, Lof does not disclose the frequency conversion method comprising the step of reducing an output voltage of the DC link circuit for increasing an output current of the DC/AC converter and/or reducing the operation frequency of electronic switches of the DC/AC converter for increasing the output current of the DC/AC converter. Whereas Widmayer discloses a power converter system (Fig. 1) comprising an AC/DC input rectifier (block on left), a DC link circuit (double arrow in center) and a variable frequency DC/AC output inverter (block on right labeled "Fluorescent Gas Discharge Lamp Control", shown in more detail in Fig. 5 as a DC/AC inverter), wherein the switching frequency of the DC/AC inverter can be decreased in order to increase the output current of the converter (Col. 13, lines 7-16). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of providing increased current in the event of a grid voltage drop disclosed by Lof by

incorporating a method of decreasing the switching frequency of the output inverter in order to increase the output current of the converter as taught by Widmayer.

In re claim 2, Lof as modified by Widmayer discloses a method for operating a frequency converter wherein at least one of the reducing steps is performed (Widmayer teaches the frequency reduction step as outlined above in re claim 1; Lof discloses the need to increase the output current of the converter during a grid voltage drop in Col. 20, lines 46-50) when, for a few seconds (Lof, Col. 20, lines 50-51), the grid voltage is decreased to about 10% of its normal value (Col. 20, lines 49-50) and wherein at least one of the reducing steps is terminated (Lof teaches in Col. 20, lines 46-50 that extra energy is provided to the output only during grid faults where the voltage sags; therefore these steps are terminated when the fault is no longer present). Lof does not disclose terminating the reducing step when, for a few seconds, the normal grid voltage is increased to about 80% of its normal value. It would have been obvious to one having ordinary skill in the art at the time the invention was made to terminate the reducing step when the grid voltage increased to about 80% of its normal value for a few seconds, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

In re claim 3, Lof as modified by Widmayer discloses a method for operating a frequency converter wherein at least one of the reducing steps is performed (Widmayer teaches the frequency reduction step as outlined above in re claim 1; Lof discloses the need to increase the output current of the converter during a grid voltage drop in Col.

20, lines 46-50) when, for a few seconds (Lof, Col. 20, lines 50-51), the grid voltage is decreased to about 20% of its normal value (Col. 20, lines 49-50; Lof teaches that the grid voltage and the power transferred by the converter can drop as low as 5 to 10%, this could also include about 20%) and wherein at least one of the reducing steps is terminated (Lof teaches in Col. 20, lines 46-50 that extra energy is provided to the output only during grid faults where the voltage sags; therefore these steps are terminated when the fault is no longer present). Lof does not disclose terminating the reducing step when, for a few seconds, the normal grid voltage is increased to about 90% of its normal value. It would have been obvious to one having ordinary skill in the art at the time the invention was made to terminate the reducing step when the grid voltage increased to about 90% of its normal value for a few seconds, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lof et al. (U.S. Patent 6,671,585) in view of Baudelot et al. (U.S. Patent 6,850,424).

In re claim 1, Lof discloses a method for operating a frequency converter (Fig. 10) of a generator (503) in particular of a wind energy turbine (503<sub>1</sub> through 503<sub>N</sub> represent wind turbines), in the event of a substantial grid voltage drop (Col. 20, lines 46-48 discloses that the system of Fig. 10 is used to provide extra power to the transmission grid during faults and voltage sags), wherein the frequency converter comprises an AC/DC converter (Fig. 10, AC/DC converter blocks connected to wind



turbine generators), to be connected to the generator, a DC/AC converter (DC/AC converter blocks within block 505) to be connected to the voltage grid ("Large scale transmission grid" on right), and a DC link circuit (1001) for connecting the AC/DC converter to the DC/AC converter. Lof discloses all of the claimed limitations except for the method comprising the step of reducing an output voltage of the DC link circuit for increasing an output current of the DC/AC converter and/or reducing the operation frequency of electronic switches of the DC/AC converter for increasing the output current of the DC/AC converter. Whereas Baudelot discloses a converter (Fig. 1) for coupling a power mains system (10) to a load (14), comprising an input side AC/DC rectifier (4), a DC link circuit (2), and a load side DC/AC inverter (6). Baudelot teaches that, for a given output power of the converter system, increasing the DC link voltage will decrease the output current of the converter (Col. 3, lines 13-14 and 16-20). It was known in the art that the inverse of this would also be true, meaning that for a given output power, a decrease in the DC link voltage will cause an increase in the converter output current. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of providing increased current in the event of a grid voltage drop disclosed by Lof to include decreasing the DC link voltage in order to supply the increased as taught by Baudelot.

In re claim 6, Baudelot discloses a method for operating a frequency converter wherein the reduction of the output voltage of the DC link circuit is performed such that an increased current flows (Baudelot, in Col. 3, lines 13-14 and 16-20, teaches that increasing the DC link voltage will decrease the output current for a given output power

and it was known in the art the inverse of this is also true as outlined above in re claim 1) without a substantial change of the energy losses in the electronic switches of the DC/AC converter (Col. 3, lines 12-13 and 28-33 teaches that by using a specific material for the switches with high reverse voltage tolerance allows the DC link voltage and the output current to be changed without increasing the switching losses).

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lof et al. (U.S. Patent 6,671,585) and Baudelot et al. (U.S. Patent 6,850,424) as applied to claim 1 above, and further in view of Scott et al. (U.S. Patent 6,144,190).

In re claim 4, Lof as modified by Baudelot disclose all of the claim limitations except for the step of reducing the output voltage of the DC link circuit comprising controlling the time interval between the zero crossover of the output voltage of a phase of the generator and an operation of an electronic switch of the AC/DC converter. Whereas Scott discloses an energy conversion system (Fig. 2) comprising an AC/DC rectifier (202) on the input side, an intermediate DC link circuit (236, 237, and 238), and a DC/AC inverter (214) on the output side, wherein the DC link voltage can be decreased by changing the firing angle of one or more of the gate drive signals (Col. 10, lines 24-27). The firing angle is defined at Col. 8, lines 47-49 as the timing between the gate signal and the zero-crossing of a phase of the generator output. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of providing increased current in the event of a grid voltage drop disclosed by Lof and Baudelot by changing the timing between the zero-crossing

of the generator output and the gate drive signals in order to decrease the DC link voltage as taught by Scott.

In re claim 5, Scott discloses a method of controlling a frequency converter (Fig. 2) wherein the step of reducing the output voltage of the DC link circuit (236, 237, and 238) comprises reducing the pulse width interval of the electronic switch of the AC/DC converter (Col. 10, lines 24-26 describes reducing the pulse width of the rectifier gate signals in order to decrease the DC link rail voltage).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Mose et al. (U.S. Patent 4,876,637) discloses an AC/DC/AC frequency conversion system wherein the output current can be adjusted by changing the intermediate DC link voltage.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred E. Finch III whose telephone number is (571)270-7883. The examiner can normally be reached on Monday through Friday, 8:00AM - 5:30PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kiesha Rose can be reached on (571)272-1844. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner, Art Unit 4116

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